

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 11-20 will be active in the application subsequent to entry of this Amendment.

The claims have been revised in order to more particularly point out and distinctly claim that which applicants regard as their invention and to address the issues raised in items 2-3 of the Official Action. For convenience a new set of claims is presented with new claims 11-20 corresponding to previous claims 1-10. The examiner will note, in particular, the revised version of claim 1, explains that the expression "at least 2 equivalents" is required only when the HA adduct of an imine ligand is used.

As the examiner requested, the corresponding discussion in the specification relating to claim 1, now new claim 11, has been changed to agree with the text of claim 11 now presented.

It is respectfully submitted that the claims are in order and compliant with 35 USC §112, second paragraph. Favorable review is requested. Should the examiner have any questions or concerns, please contact the undersigned.

With regard to the requirement for election of species as stated in item 1 of the Official Action, counsel and applicants note that claim 7 has been withdrawn from consideration, however this appears to be incorrect and is carried forward now as new claim 17. Reconsideration is requested.

The balance of the Official Action deals with a single prior art-based rejection based upon a combination of three references. To the extent that the rejection is thought to be pertinent to the new claims presented above, it is respectfully traversed.

Previous claims 1-3, 5, 6 and 8-10 were rejected as obvious over Spence (U.S. 6,355,744) in view of Gao (CA 2261518) and Nielsen (US 2004/0010142).

From the amended version of claim 1 (now new claim 11) it can be seen that the final product (e.g. $\text{CpTi(IV)(Bu}_3\text{P=N)Cl}_2$) can be made by reacting (a) $\text{Bu}_3\text{P=N-H}$ with CpTiCl_3 in the presence of at least one equivalent of a base (BuLi) or (b) by reacting its HA adduct $\text{Bu}_3\text{P-NH}_2\text{Cl}$ with CpTiCl_3 in the presence of at least two equivalents of a base. Both cases will be discussed separately.

(a) Haken describes in Synthesis 2 (Col. 8) a two step process in which $\text{Bu}_3\text{P=N-H}$ is first reacted with $n\text{-BuLi}$ to $\text{Bu}_3\text{P=NLi}$, and thereafter this product is subsequently reacted with

CpTiCl_3 to $\text{CpTi(IV)(Bu}_3\text{P=N)Cl}_2$.

In the Attachment a number of examples are given in which the method according to the invention is applied in trials to make a few other catalysts described by DOW and Exxon.

These examples show that for these catalysts the method of the present invention does not result in the desired catalyst. For this reason it is known in the art to make metallocene catalysts according to the method described by Haken.

From Haken it cannot be derived that CpTiCl_3 in the presence of a strong base like BuLi is not transformed into unstable butylated Ti(IV) complexes like CpTiBuCl_2 , CpTiBu_2Cl or CpTiBu_3 -- it is known in the art that they decompose to inactive low valency Ti compounds.

The fact that the one step process of the present invention resulted in an active catalyst for the phosphinimine catalyst is unexpected and could not be derived from Haken or any other publication.

(b) Gao describes an additional step in which $\text{R}_3\text{PNH}_2\text{X}$ (e.g. $\text{Bu}_3\text{PNH}_2\text{Cl}$) is first converted to $\text{R}_3\text{P=NH}$ before the two step process described above under (a) is conducted.

The three step process described by Gao to make e.g. $\text{CpTi(IV)(Bu}_3\text{P=N)Cl}_2$ starting from $\text{Bu}_3\text{PNH}_2\text{Cl}$ is even further removed from the process of the present invention, in which the three steps are reduced to just one reaction step: $\text{Bu}_3\text{PNH}_2\text{Cl}$ is contacted with CpTiCl_3 in the presence of at least two equivalents of BuLi.

Another feature that could not be derived from Gao, nor from Nielsen (US 2004/0010142) is, that the one step process can be carried out in the presence of a relatively weak base like, e.g. K_2CO_3 . Firstly of all the step proposed by Gao requires a relatively strong base to subtract the HA adduct. Secondly, and in particular with the K_2CO_3 it is surprising that no water is formed that would destroy the catalyst. Example III shows that pure tris(N,N-dimethylamido)phosphoraneimido cyclopentadienyl titanium(IV) dichloride was formed with K_2CO_3 as base.

The process of the present invention is therefore not obvious in view of Haken alone or Haken in combination with Gao and Nielsen.

Reconsideration and favorable action are solicited. Should the examiner require further information, please advise.

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Attempted preparation of dimethylsilylbiscyclopentadienyltitanium(IV) dibenzyl

TiCl₄ (5.2 mL; 1.0M in toluene, 5.2 mmol) was added to a solution of biscyclopentadienyldimethylsilane (1.00 g; 5.3 mmol) in THF (50 mL) at -78°C. Then, a solution of benzylmagnesiumchloride (10.6 mL, 1.0M, 10.6 mmol) was added. The mixture was warmed to room temperature by removing the dry ice/acetone bath and the mixture was stirred at room temperature for 16 hours. A sample was analysed by ¹H-NMR and the desired product was absent.

Attempted preparation of 2,2'-biphenylbis(2-indenyl)titanium(IV) dibenzyl

TiCl₄ (2.6 mL; 1.0M in toluene, 2.6 mmol) was added to a suspension of 2,2'-bis(2-indenyl)biphenyl (1.00 g; 2.6 mmol) in THF (50 mL) at -78°C. Then, a solution of benzylmagnesiumchloride (5.2 mL, 1.0M, 5.2 mmol) was added. The mixture was warmed to room temperature by removing the dry ice/acetone bath and the mixture was stirred at room temperature for 16 hours. A sample was analysed by ¹H-NMR and the desired product was absent.

Attempted preparation of 9-((cyclopenta-1,3-dienyl)diphenylmethyl)fluorenyl titanium(IV) dibenzyl

TiCl₄ (2.5 mL; 1.0M in toluene, 2.5 mmol) was added to a suspension of 9-((cyclopenta-1,3-dienyl)diphenylmethyl)-9H-fluorene (1.00 g; 2.5 mmol) in THF (50 mL) at -78°C. Then, a solution of benzylmagnesiumchloride (5.0 mL, 1.0M, 5.0 mmol) was added. The mixture was warmed to room temperature by removing the dry ice/acetone bath and the mixture was stirred at room temperature for 16 hours. A sample was analysed by ¹H-NMR and the desired product was absent.

Attempted preparation of 2,2'-biphenylbis(2-indenyl)titanium(IV) dichloride using benzylmagnesiumchloride as a base

ZrCl₄ (0.60g; 2.6 mmol) was added to a suspension of 2,2'-bis(2-indenyl)biphenyl (1.00 g; 2.6 mmol) in THF (50 mL) at -78°C. Then, a solution of benzylmagnesiumchloride (5.2 mL, 1.0M, 5.2 mmol) was added. The mixture was warmed to room temperature by removing the dry ice/acetone bath and the mixture was stirred at room temperature for 16 hours. A sample was analysed by ¹H-NMR and the desired product was absent. Even after reflux no conversion could be observed.

Attempted preparation of 2,2'-biphenylbis(2-indenyl)titanium(IV) dichloride using n-BuLi as a base

ZrCl₄ (0.51g; 2.2 mmol) was added to a suspension of 2,2'-bis(2-indenyl)biphenyl (0.86 g; 2.2 mmol) in THF (50 mL) at -78°C. Then, a solution of n-BuLi (1.3 mL, 1.6M, 2.2 mmol) was added. The mixture was warmed to room temperature by removing the dry ice/acetone bath and the mixture was stirred at room temperature for 16 hours. A sample was analysed by ¹H-NMR and the desired product was absent. Even after reflux no conversion could be observed.